



EXHIBIT A

JHU/APL File No. 1813-  
(to be assigned by OPC)

APPLIED PHYSICS LABORATORY  
INTELLECTUAL PROPERTY DISCLOSURE SHEET

1. TYPE OF INTELLECTUAL PROPERTY: ☒ Invention ☐ Copyrighted Work ☐ Software

2. DESCRIPTIVE TITLE (of the invention/copyrighted work/software):

Detection of genuine and hoax biological and non biological contaminants on various media

RECEIVED

MAR 05 2002

PAC  
3/7/02

OFFICE OF  
PATENT COUNSEL

3. INVENTOR/CREATOR (AUTHOR) INFORMATION:

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Bethesda, MD 20814

Employer, if not an APL Employee:

☒ Check here if additional inventors/creators and complete the attached Additional Inventors/Creators Continuation Sheet. Go to Inventors/Creators Continuation Sheet

EXHIBIT A

#### 4. DESCRIPTION OF THE TECHNOLOGY:

- Written Description (Describe the invention in such detail that a person moderately skilled in the art may understand how to make and use it. In addition, attach any memos, etc. which show or describe the invention and identify them positively (i.e., by date and office symbol) below.)

See attached.

## Intellectual Property Disclosure

### 4. Description of Technology

**Title:**

Detection of genuine and hoax biological and non biological contaminants on various media.

**Summary:**

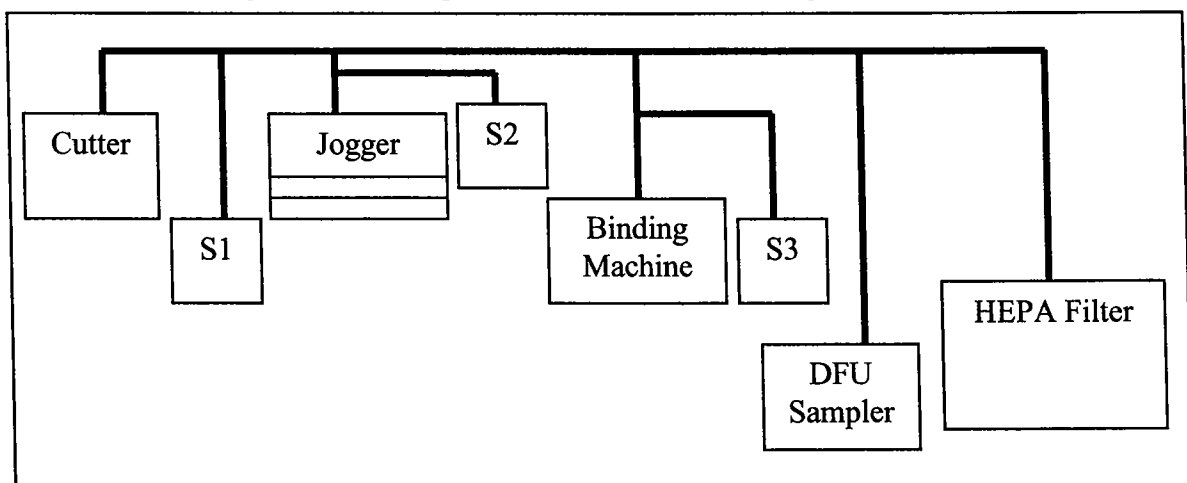
This disclosure outlines a method developed to detect biological warfare agents contained in or on various media. The system combines realtime and post processing analysis for the detection of threat and hoax particles. The realtime system is capable of detecting both real and hoax particles contained inside and on the outside of various items including packages, envelopes, magazines and boxes.

**System Description:**

The concept was first discussed on the 12<sup>th</sup> of November 2001 with our sponsor. General thought indicated that a system to detect particles placed inline with a mail processing operation would prevent both real and hoax threat envelopes from reaching the addressee.

Testing from November 13<sup>th</sup> to November 27<sup>th</sup> indicated that a single particle counter placed downstream of a jogging machine is sufficient and effective at detection of foreign contaminants at relatively low levels. The additional use of a particle sampler would allow confirmatory analysis using highly sensitive methods such as PCR for low level threats and cross contamination.

The initial configuration of samplers tested is indicated in Figure 1 below



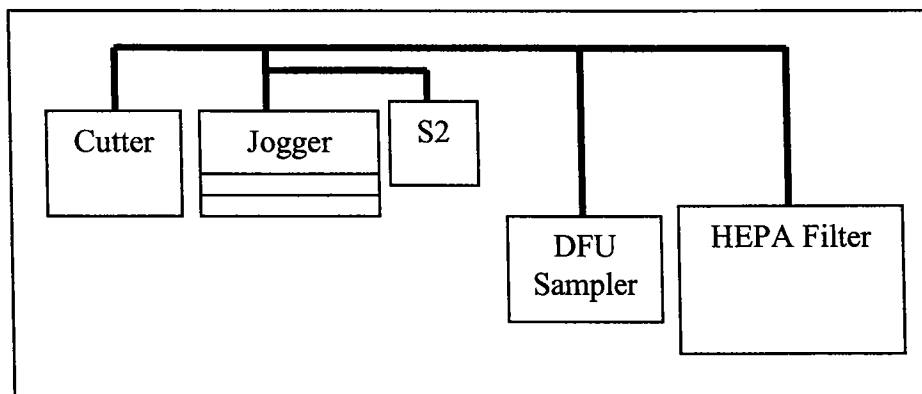
**Figure 1** Figure shows a schematic of the configurations evaluated in initial testing. Note that experiments indicate that only sampler #2 is required for low-level detection.

The cutter in Figure 1 is used to open the questionable package if the interior is to be tested. The package can have a small hole punched, be sliced open or can be partially

slit. This serves to allow any contained material a method to be expelled. The jogger agitates the material to be tested. The jogger can be either a common machine used to align paper bundles or could conceivably consist of a pressurized air source or a vacuum source. The primary requirement of the process is that it should liberate particulates from the questionable surface or container. The third step squeezes the container either by binding or by compressing the package. This step forces available particulate matter from the interior into the airstream where it may then be sampled. The squeezing or binding in this case is combined with the jogger to increase the amount of material released.

The second to last component in Figure 1 above is the Dry Filter Unit (DFU). The DFU can easily be replaced with another confirmatory analysis system or liquid or solid sampler unit. This unit is used as a second detection system to ensure detection of real threat agents that are not detected by the particle counter.

Test data has been obtained from each of the locations included in figure 1 above. In the application of detecting loose powder in sealed envelopes, an effective arrangement was determined to be similar to Figure 2 below.



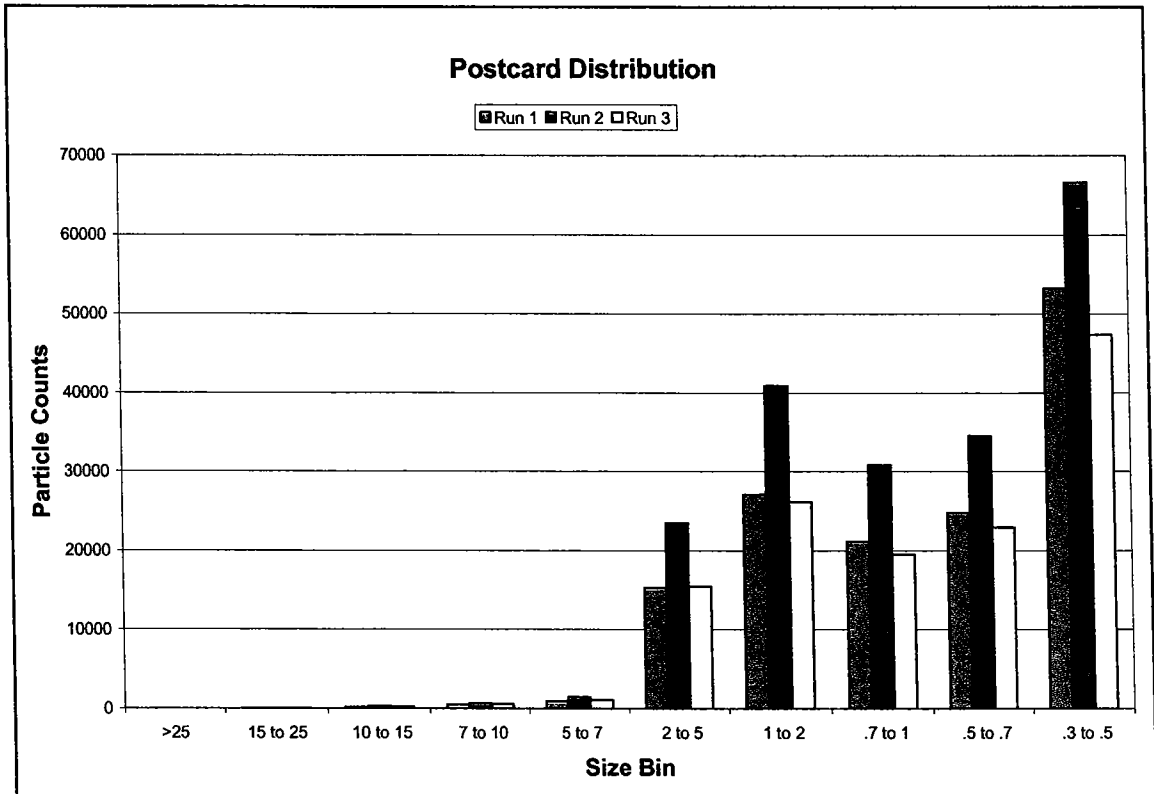
**Figure 2** Figure shows the current arrangement used to detect particulate material contained in envelop type packages. The jogger in this case also has a mechanism to allow squeezing and has a cover reduce particle loss to the surrounding environment.

#### **Detection System:**

The primary objective of the system is to induce release of contained particulates in a burst sufficient enough to be detected by the particle counter placed downstream. The system is configured to detect, and potentially discriminate between hoax and actual threat contamination. The detection system can utilize one or a combination of a variety of detection methods including, but not limited to the following;

- 1.) Absolute particle count detection
- 2.) Particle Size discriminatory detection
- 3.) Particle fluorescence detection
- 4.) Particle fluorescence coupled with size detection.

Initial data indicate that certain mail types produce characteristic signatures that can be removed by physical separation or by signal processing. For example, post cards tend to produce a particle distribution that is highly concentrated in the 1 to 5 micron size range. Figure 3 shows a typical particle distribution for 3 runs of jogging postcards.



**Figure 3** Figure shows an example of a typical particle distribution for postcards agitated on a commercial jogger.

#### **4. DESCRIPTION OF THE TECHNOLOGY:**

- Sketch or drawing of the invention. (Import or draw sketch here, or if space is insufficient staple your sketch to the printed copy of this form.)

#### 4. DESCRIPTION OF THE TECHNOLOGY (Continued):

- Specify the novel features of this invention. How does the invention differ from present technology?

This system provides a means for rapidly screening mail for suspicious powders that might be hazardous.

- What is the deficiency in the present technology upon which your invention improves?

Current mail processing systems do not screen for hazardous materials.

- Identify and describe the closest technological development of which you are aware.

None.

- Software: (Include in the Written Description above, all novel algorithms implemented in your software.)
  - ◆ List any software from which the disclosed software was derived.

Visual Basic (Microsoft)

- ◆ List any software developed by a third party which is included in your software or which serves as a platform on which your software runs.

PCMCIA Serial Port Replicator Qualtech

- ◆ Name of third party software owner: Qualtech
- ◆ Have you obtained written permission to use the third party's software?: No
- ◆ List all proprietary or personal data used in your software, i.e., patient data, pictures, videos, names, etc.

## 5. INVENTION DEVELOPMENT:

- State of technology (check the appropriate box):

☐ Concept      ☐ Reduced to Practice      ☒ Working Prototype      ☐ Ready to license as final product

- Future research plan

- ◆ What additional research is needed to complete development and testing of the invention? Include brief description of problems to be solved and cost estimate.

Improved methods for particle sampling and detection algorithms

- ◆ Is this research presently being undertaken? ☒ Yes ☐ No
- ◆ Actively pursued? ☒ Yes ☐ No
- ◆ If yes, under whose sponsorship? USG
- ◆ Should corporate sponsorship be pursued? ☒ Yes ☐ No

## 6. CONCEPTION AND REDUCTION TO PRACTICE:

- Earliest date and place invention was conceived (Give brief outline of circumstances):

11/12/01 - Our sponsor requested assistance from APL to examine ways to process mail. A conceptual approach was developed during this meeting.

- Date, place, and present location of first sketch, drawing or photo illustrating invention:

A system concept was first documented by Micah Carlson on 11/15/2001. This document is available electronically.

- Date, place, and present location of first written description of invention:

Same as above.

- Reduction of the invention to practice.

- ◆ Date, place of completion, and present location of first operating model:

11/13/01 - Located in Alexandria, VA

- ◆ Date, place, and results of test(s):

11/13/01 - Alexandria, VA

- ◆ Names of witness(es) of test(s):

Micah Carlson, Adam Arabian, Roger Gibbs

- ◆ Identify records of test(s) and give present location of records:

Summary notes by Micah Carlson available from same.



## 7. COMMERCIALIZATION:

- List field(s) of application for the invention:

Mail processing

- Describe alternate technology or products/processes/services currently on the market of which you are aware that accomplish the purpose of this invention:

None--although many companies and government organizations are looking at this.

- List all products/processes/services you envision resulting from the invention and whether these products can be developed in the near term (less than two years) or long term:

Commercial and private mail handling systems.

- List all companies you believe may be interested in this technology. Provide contact(s), address(es), and phone number of each (if available):

TBD

## 8. RESEARCH SUPPORT (to develop the invention): (Check all appropriate boxes below.)

☐ Substantial Laboratory time, facilities or materials

☐ Internal Laboratory funds

Type (IRAD, FEE, DEVELOPMENT FUND, OVERHEAD, B&P): \_\_\_\_\_

Task no.: \_\_\_\_\_

☐ Non-Federal contract or grant

Entity: \_\_\_\_\_

Contract or grant no.: \_\_\_\_\_

Task no.: \_\_\_\_\_

SMBG1

☐ Federal government contract or grant

Project Name: \_\_\_\_\_

Agency: NAYSEA - Army

Contract or grant no.: N00024-98-D-8124

Task no.: \_\_\_\_\_

Sponsor Name, Address, and Phone No.: \_\_\_\_\_

Security Classification: Unclassified

**9. DISCLOSURE OF INVENTION:**

● External to Laboratory:

Date	Place	Names and Addresses	Form (Written/Oral)	Was Nondisclosure Agreement Signed?
11/15/01	Alexandria Processing Facility	Carl Johnson, Pitney Bowes	Oral & photographs taken	No

● Date of First Operational Use, if any: 12/14/2001

● Publication (Has a description of the invention been published or is publication anticipated? If yes, provide name(s) and date(s) of publication or anticipated publication. ATTACH COPY(IES) HERETO):

No

**Prior to disclosure of any information outside of the Laboratory, a Confidential Disclosure and Non-use Agreement should be executed. Please contact the Office of Patent Counsel (x5632) for this document.**

SIGNATURE OF INVENTOR(S)

Date 1/22/02

Date 2/20/02

Date 2/23/02

Date

Date

Date

Date

The above-described  
invention was described  
to and understood by me

WITNESS

Date

WITNESS

Date

*Print 2 copies of this form. Send a signed copy to the Office of Patent Counsel, Room 7-150.  
Keep one copy for your records.*



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**APPLIED PHYSICS LABORATORY**  
**INTELLECTUAL PROPERTY DISCLOSURE SHEET**  
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